condition of the optical signal. In one embodiment, the optical device is a mode coupler 28. Mode coupler 28 is configured to introduce a mechanical or index deformation of a portion of the optical fiber 20, and create perturbations in the optical modes in fiber 20 and provide a coherent coupling between two modes. Mode coupler 28 can couple a core mode to a cladding mode, one core mode to a different core mode and one cladding mode to a different cladding mode Suitable mode coupler's 28 include AOTF's, acoustic gratings, UV gratings, bending gratings and stress induced gratings as disclosed in serial no. 09/801,566 filed 03/07/2001 and identified as attorney docket no. 21501-731 and serial no. 09/765,971 filed 01/19/2001, fully incorporated herein.

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In one embodiment, illustrated in Figure 4, mode coupler 28 is an AOTF that includes an acoustic wave propagation member 30 and an acoustic wave generator 32. Acoustic wave generator 32 can produce multiple acoustic signals with individual controllable strengths and frequencies. Each of the acoustic signals provides a coupling between different modes traveling within optical fiber 20. A wavelength of an optical signal coupled between two different modes traveling within optical fiber 20 can be changed by varying the frequency of a signal applied to acoustic wave generator 32. Additionally, an amount of an optical signal coupled between two different modes traveling within optical fiber 20 can be changed by varying the amplitude of a signal applied to acoustic wave generator 32.

Referring now to Figure 5, a second AOTF mode coupler 34 is coupled to mode coupler 28. A circulator is coupled to second AOTF mode coupler 34. Delays 38 and 40 can also be included.

The foregoing description of a preferred embodiment of the invention has been presented for purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise forms